# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15

11.08.2014

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| **Name of the Work** | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| **Source / Location** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 11.08.2014 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Trial No. 3 | Average |
|---|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 374 | 376 | 378 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 78 | 81 | 83 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 296 | 295 | 295 | |
| 4 | Aggregate Impact value = percent fines 100* ($W_2/W_1$)% | 20.86 | 21.54 | 21.96 | 21.45 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

Note:

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M/s. Civil-Tech Consultants & Engineers
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Assistant Executive Engineer,
Kodigehalli Sub Division,
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Bangalore.

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11.08.2014

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| Name of the Work | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| Source / Location | Hot Mix Plant, Bangalore |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 11.08.2014 |

| Sl No. | Details | Trial No. | | | Average |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 383 | 385 | 386 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 81 | 84 | 85 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 302 | 301 | 301 | |
| 4 | Aggregate Impact value = percent fines<br>100* ($W_2/W_1$)% | 21.15 | 21.82 | 22.02 | 21.66 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15

11.08.2014

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| **Name of the Work** | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| **Source / Location** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 11.08.2014 |

| Sl No. | Details | Trial No. | | | Average |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 379 | 383 | 385 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 84 | 87 | 86 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 295 | 296 | 299 | |
| 4 | Aggregate Impact value = percent fines<br>100* ($W_2/W_1$)% | 22.16 | 22.72 | 22.34 | 22.41 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15 : 12.08.2014

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | : **Technical Manager,** KRIDL, BBMP, Bangalore. |
| Name of Work | : Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | : Semi Dense Bituminous Concrete |
| Date of Testing | : 12.08.2014 |

Result : Flakiness Index = **11.23%**

Elongation Index = **13.42%**

Result : Combined Flakiness & Elongation index **24.65%**

Comments:

→ Maximum allowable combined Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15 : 12.08.2014

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | : **Technical Manager,** KRIDL, BBMP, Bangalore. |
| Name of Work | : Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | : Semi Dense Bituminous Concrete |
| Date of Testing | : 12.08.2014 |

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.54%**

Elongation Index = **13.37%**

Result : Combined Flakiness & Elongation index **24.91%**

Comments:

→ Maximum allowable combined Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15 : 12.08.2014

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | : **Technical Manager,** KRIDL, BBMP, Bangalore. |
| Name of Work | : Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | : Semi Dense Bituminous Concrete |
| Date of Testing | : 12.08.2014 |

Result : Flakiness Index = **11.65%**

Elongation Index = **13.58%**

Result : Combined Flakiness & Elongation index **25.23%**

Comments:

→ Maximum allowable combined Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Stripping/2014-15 13.08.2014

## Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| Name of the work | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 13.08.2014 |

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|---|---|---|---|
| 1 | 2.9 | 3.10 | 96.90 |
| 2 | 3.1 | | |
| 3 | 3.3 | | |

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Sp_Wa/2014-15 14.08.2014

## Specific Gravity And Water Absorption Test

IS: 2386 Part III

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| Name of the Work | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| Type of Mix | Semi Dense Bituminous Concrete |
| Source / Location | Hotmix Plant, Bangalore |
| Date of Testing | 14.08.2014 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 2022 | 2023 | 2025 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 750 | 750 | 750 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_s$ g | 1272 | 1273 | 1275 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2044 | 2046 | 2047 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_S)$ g | 772 | 773 | 772 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 2024 | 2025 | 2028 | |
| 7 | Specific Gravity | $W_4/(W_3-W_S)$ | 2.622 | 2.620 | 2.627 | 2.623 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_S)$ | 2.691 | 2.693 | 2.693 | 2.693 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 0.99% | 1.04% | 0.94% | 0.99% |

**Comments:**

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Bitumen/2014-15 13.08.2014

## BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX AASHTO T 164 & AASHTO T 30

| | |
|---|---|
| CLIENT | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| AGENCY | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| NAME OF THE WORK | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| SAMPLE I/D | Roads in Hoodi Muniswamappa Layout, Ward No. 07 |
| DATE OF TESTING | 13.08.2014 |

### BITUMEN CONTENT DETERMINATION

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 476.5 | 477 |
| 3. Weight of Asphalt and Mineral matter Extracted, | - | - |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | | |
| 6. Weight of Bitumen Extracted, g. (corrected) | 23.5 | 23.00 |
| 7. Bitumen content in % | 4.70 | 4.60 |
| 8. Average | **4.65** | |

### GRADATION AFTER EXTRACTION

| SIEVE SIZE | Trail 1 | | | | JOBMIX |
|---|---|---|---|---|---|
| mm | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | Gradation |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 24.65 | 5.17 | 5.17 | 94.83 | 90-100 |
| 4.75 | 243.75 | 51.15 | 56.33 | 43.67 | 35-51 |
| 2.36 | 48.96 | 10.27 | 66.60 | 33.40 | 24-39 |
| 1.18 | 45.32 | 9.51 | 76.11 | 23.89 | 15-30 |
| 0.3 | 52.19 | 10.95 | 87.07 | 12.93 | 9-19 |
| 0.075 | 41.84 | 8.78 | 95.85 | 4.15 | 3-8 |

| SIEVE SIZE | Trail 2 | | | | JOBMIX |
|---|---|---|---|---|---|
| mm | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | Gradation |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 25.53 | 5.11 | 5.11 | 94.89 | 90-100 |
| 4.75 | 238.94 | 47.79 | 52.89 | 47.11 | 35-51 |
| 2.36 | 98.56 | 19.71 | 72.61 | 27.39 | 24-39 |
| 1.18 | 46.72 | 9.34 | 81.95 | 18.05 | 15-30 |
| 0.3 | 26.48 | 5.30 | 87.25 | 12.75 | 9-19 |
| 0.075 | 37.82 | 7.56 | 94.81 | 5.19 | 3-8 |

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Bitumen/2014-15 14.08.2014

## BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX AASHTO T 164 & AASHTO T 30

| | |
|---|---|
| CLIENT | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| AGENCY | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| NAME OF THE WORK | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| SAMPLE I/D | Roads in Hoodi Muniswamappa Layout, Ward No. 07 |
| DATE OF TESTING | 14.08.2014 |

### BITUMEN CONTENT DETERMINATION

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 476.5 | 477.5 |
| 3. Weight of Asphalt and Mineral matter Extracted, | - | - |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | | |
| 6. Weight of Bitumen Extracted, g. (corrected) | 23.5 | 22.50 |
| 7. Bitumen content in % | 4.70 | 4.50 |
| 8. Average | **4.60** | |

### GRADATION AFTER EXTRACTION

| SIEVE SIZE | Trail 1 | | | | JOBMIX |
|---|---|---|---|---|---|
| mm | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | Gradation |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 25.16 | 5.28 | 5.28 | 94.72 | 90-100 |
| 4.75 | 242.84 | 50.96 | 56.24 | 43.76 | 35-51 |
| 2.36 | 49.53 | 10.39 | 66.64 | 33.36 | 24-39 |
| 1.18 | 44.25 | 9.29 | 75.92 | 24.08 | 15-30 |
| 0.3 | 48.73 | 10.23 | 86.15 | 13.85 | 9-19 |
| 0.075 | 45.18 | 9.48 | 95.63 | 4.37 | 3-8 |

| SIEVE SIZE | Trail 2 | | | | JOBMIX |
|---|---|---|---|---|---|
| mm | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | Gradation |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 26.32 | 5.26 | 5.26 | 94.74 | 90-100 |
| 4.75 | 239.78 | 47.96 | 53.22 | 46.78 | 35-51 |
| 2.36 | 96.85 | 19.37 | 72.59 | 27.41 | 24-39 |
| 1.18 | 45.26 | 9.05 | 81.64 | 18.36 | 15-30 |
| 0.3 | 23.12 | 4.62 | 86.27 | 13.73 | 9-19 |
| 0.075 | 38.94 | 7.79 | 94.05 | 5.95 | 3-8 |

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Assistant Executive Engineer, Kodigehalli Sub Division, B.B.M.P. Bangalore

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13.08.2014

## Aggregate Gradation Test

IS : 2386 Part I

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| **Name of the Work** | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| **Sample I / D** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete (SDBC) |
| **Date of Testing** | 13.08.2014 |

Total Weight of Sample: 5475 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade II MORTH specification |
| 9.5 | 412 | 7.5 | 7.53 | 92.47 | 90-100 | |
| 4.75 | 3015 | 55.1 | 62.59 | 37.41 | 35-51 | |
| 2.36 | 643 | 11.7 | 74.34 | 25.66 | 24-39 | |
| 1.18 | 424 | 7.7 | 82.08 | 17.92 | 15-30 | |
| 0.3 | 379 | 6.9 | 89.00 | 11.00 | 9-19 | |
| 0.075 | 259 | 4.7 | 93.74 | 6.26 | 3-8 | |

Total Weight of Sample: 5550 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade II MORTH specification |
| 9.5 | 346 | 6.2 | 6.23 | 93.77 | 90-100 | |
| 4.75 | 2995 | 54.0 | 60.20 | 39.80 | 35-51 | |
| 2.36 | 723 | 13.0 | 73.23 | 26.77 | 24-39 | |
| 1.18 | 462 | 8.3 | 81.55 | 18.45 | 15-30 | |
| 0.3 | 324 | 5.8 | 87.39 | 12.61 | 9-19 | |
| 0.075 | 385 | 6.9 | 94.32 | 5.68 | 3-8 | |

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14.08.2014

## Aggregate Gradation Test

IS : 2386 Part I

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, BBMP, Bangalore. |
| **Name of the Work** | Improvements of roads in Hoodi Muniswamappa Layout in Ward No. 07, Byatarayanapura, Kodigehalli Sub Division, BBMP, Bangalore. |
| **Sample I / D** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete (SDBC) |
| **Date of Testing** | 14.08.2014 |

Total Weight of Sample: 5425 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade II MORTH specification |
| 9.5 | 428 | 7.9 | 7.89 | 92.11 | 90-100 | |
| 4.75 | 2996 | 55.2 | 63.12 | 36.88 | 35-51 | |
| 2.36 | 692 | 12.8 | 75.87 | 24.13 | 24-39 | |
| 1.18 | 437 | 8.1 | 83.93 | 16.07 | 15-30 | |
| 0.3 | 276 | 5.1 | 89.01 | 10.99 | 9-19 | |
| 0.075 | 237 | 4.4 | 93.38 | 6.62 | 3-8 | |

Total Weight of Sample: 5575 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade II MORTH specification |
| 9.5 | 365 | 6.5 | 6.55 | 93.45 | 90-100 | |
| 4.75 | 2929 | 52.5 | 59.09 | 40.91 | 35-51 | |
| 2.36 | 785 | 14.1 | 73.17 | 26.83 | 24-39 | |
| 1.18 | 458 | 8.2 | 81.38 | 18.62 | 15-30 | |
| 0.3 | 278 | 5.0 | 86.37 | 13.63 | 9-19 | |
| 0.075 | 459 | 8.2 | 94.60 | 5.40 | 3-8 | |

**Note:**

- This test report should not be reproduced except in full, without written approval of the laboratory
- The results indicated above are based on the tests carried out on the samples received in the laboratory
- Any Query regarding the report must be reported within 15 days from the date of testing

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